

Claims:

Amend the claims 1-20 as follows:

Claim 1 (currently amended): A multiband UWB ultra wideband (UWB) communication transmitter comprising:

an encoder coupled to an interleaver;

said interleaver coupled to a polyphase-based multichannel;

said polyphase-based multichannel coupled to a shaped pulse generator; [[and]]

said shaped pulse generator coupled to a multichannel-based multicarrier modulator;

said shaped pulse generator generates shaped digital pulses;

said multichannel-based multicarrier modulator coupled to a power amplifier (PA); and

a clock control coupled to said polyphase-based multichannel, said shaped pulse generator, and said multichannel-based multicarrier modulator.

~~a N-switch in parallel to connect from the polyphase-based multichannel to the shaped pulse generator coupled to a multichannel-based multicarrier modulator.~~

Claim 2 (currently amended): The multiband UWB communication transmitter of claim 1 wherein [[said]] a combination transceiver structure of the polyphase-based multichannel, the shaped pulse generator, and the multichannel-based multicarrier modulator further includes:
~~an adjustable serial-to-parallel unit or a switch unit with rotating in a counterclockwise at an adjustable uniform speed.~~

positive and negative pulse banks coupled to two digital-to-analog (D/A) converters;

an adjustable serial-to-parallel (S/P) unit coupled to N multichannel switch units, where N is an integer and greater than 1;

the N multichannel switch units coupled to N multiplier units;

each of the multiplier units has a unique carrier;

the N multiplier units coupled to a summation;

the two D/A converters coupled to the N multichannel switch units; and

a software control coupled to the adjustable S/P unit, the positive and negative pulse banks, and the N multichannel switch units.

Claim 3 (currently amended): The multiband UWB communication transmitter of claim 2 wherein the adjustable ~~serial-to-parallel~~ S/P unit ~~produces from one serial symbol sequence to N-channel symbol sequence in parallel, with one symbol separation on each channel for BPSK modulation or with two symbol separation on each channel for QPSK modulation.~~ is used to generate N parallel channels from one serial symbol separated with an equal space that is programmable and controllable by the software control, where N is an integer and greater than 1.

Claim 4 (currently amended): The multiband UWB communication transmitter of claim 2 wherein ~~the switch unit with rotating in a counterclockwise at an adjustable uniform speed generates from one serial symbol sequence to~~

~~N-channel symbol sequence in parallel for BPSK modulation when said switch rotates to one of the N-channel at uniform speed of every symbol or for QPSK modulation when said switch rotates to one of the N-channel at uniform speed of every two symbols.~~ said combination transceiver structure is programmable and generates scalability shaped digital pulses with different carriers for N channels, where N is an integer and greater than 1.

Claim 5 (currently amended): The multiband UWB communication transmitter of claim 1 wherein said shaped pulse generator further includes: ~~RAM or ROM memories for storing shaped digital pulses, A/D converters with same sampling frequency rate, and controllable switches to connect from the RAM or ROM memories to the A/D converters.~~

a positive pulse bank containing two positive memory banks with two outputs connected to a positive pulse switch unit;

a negative pulse bank containing two negative memory banks with two outputs connected to a negative pulse switch unit;

a software control coupled to the positive pulse switch unit and the negative pulse switch unit;

the positive pulse switch unit and the negative pulse switch unit has two inputs and one output; and

the two positive memory banks and the two negative memory banks are either random access memory (RAM) or read-only-memory (ROM).

Claim 6 (currently amended): The multiband UWB communication transmitter of claim [[5]] 1 wherein the shaped digital pulses are one type of positive and negative indoor shaped digital ~~pauses~~ pulses ~~[[with]]~~ having a phase difference, and another type of positive and negative outdoor shaped digital pulses with ~~[[a]]~~ the phase difference.

Claim 7 (currently amended): The multiband UWB communication transmitter of claim 6 wherein said positive and negative indoor shaped digital pulses are used for ~~[[the]]~~ an indoor UWB communication transceiver and said positive and negative outdoor shaped digital pulses are used for ~~[[the]]~~ an outdoor UWB communication transceiver.

Claim 8 (currently amended): The multiband UWB communication transmitter of claim 6 wherein said positive and negative indoor or outdoor shaped digital pulses are used to represent one symbol for ~~[[BPSK]]~~ binary phase-shift keying (BPSK) modulation or to represent two symbols for ~~[[QPSK]]~~ quadrature phase-shift keying (QPSK) modulation with a delay time of said positive and negative indoor or outdoor shaped digital pulses in position.

Claim 9 (currently amended): The multiband UWB communication transmitter of claim ~~[[1]]~~ 2 wherein said ~~multichannel-based multicarrier modulator provides N independent carrier for N-channel based shaped digital pulses of said shaped pulse generator and coherently combines the shaped digital pulses with the N independent carrier of all the channels.~~ combination transceiver

structure provides eleven transmission data rates with a scalability from 650 Msps to 7.15 Gsps.

Claim 10 (currently amended): ~~A shaped pulse generator having multichannel switches comprising memory banks of storing shaped digital pulses, memory bank switches, and A/D converters that produce said shaped digital pulse based on one symbol for BPSK modulation channel or based on two symbols for QPSK modulation.~~ A multiband ultra wideband (UWB) transceiver includes:

a shaped pulse generator coupled to N multichannel switch units, where N is an integer and greater than 1;

the shaped pulse generator further comprising a positive pulse bank, a negative pulse bank, and two digital-to-analog (D/A) converters;

the positive pulse bank further having two positive memory banks and a positive pulse switch unit;

the negative pulse bank further enclosing two negative memory banks and a negative pulse switch unit;

the two positive memory banks storing a positive indoor shaped digital pulse and a positive outdoor shaped digital pulse;

the two negative memory banks storing a negative indoor shaped digital pulse and a negative outdoor shaped digital pulse;

the two D/A converters coupled to the N multichannel switch units;

a software control coupled to the positive pulse switch unit and the negative pulse switch unit; and

the software control coupled to the positive and negative pulse banks and the N multichannel switch units.

Claim 11 (currently amended): The ~~shaped pulse generator~~ multiband UWB transceiver of claim 10 wherein said two positive memory banks ~~includes four RAM or ROM memories that store the positive indoor shaped digital pulse, the negative indoor shaped digital pulse, the positive outdoor shaped digital pulse, and negative outdoor shaped digital pulse.~~ and said two negative memory banks are either random access memories (RAMs) or read only memories (ROMs).

Claim 12 (currently amended): The ~~shaped pulse generator~~ multiband UWB transceiver of claim 10 wherein said N multichannel switch[[es]] units ~~connect~~ coupled to one of the two [[A/D]] D/A converters that connects to one of the RAM or ROM memories of two positive memory banks storing said positive indoor ~~and outdoor~~ shaped digital pulse or storing said positive outdoor shaped digital pulse based on one "0" symbol for a binary phase-shift keying (BPSK) modulation [[for]] during the indoor [[and]] or outdoor UWB operations. ~~based on one "0" symbol for BPSK modulation.~~

Claim 13 (currently amended): The ~~shaped pulse generator~~ multiband UWB transceiver of claim 10 wherein said N multichannel switch[[es]] units ~~connect~~ coupled to one of the two [[A/D]] D/A converters that connects to one of the RAM or ROM memories of two negative memory banks storing said negative indoor ~~and outdoor~~ shaped digital

pulse or storing said negative outdoor shaped digital pulse based on one "1" symbol for the BPSK modulation ~~[[for]] during the indoor or outdoor UWB operations. based on one "1" symbol for BPSK modulation.~~

Claim 14 (currently amended): The ~~shaped pulse generator~~ multiband UWB transceiver of claim 10 wherein said N multichannel switch~~[[es]]~~ units ~~connect~~ coupled to one of the two ~~[[A/D]]~~ D/A converters that connects to one of the RAM or ROM memory of two positive memory banks storing said positive indoor ~~and outdoor~~ shaped digital pulse or storing said positive outdoor shaped digital pulse based on the most significant symbol "0" of two symbols for a quadrature phase-shift keying (QPSK) modulation ~~[[for]] during the indoor [[and]] or outdoor UWB operations. based on the most significant symbol "0" of two symbols for QPSK modulation.~~

Claim 15 (currently amended): The ~~shaped pulse generator~~ multiband UWB transceiver of claim 10 wherein said N multichannel switch~~[[es]]~~ units ~~connect~~ coupled to one of the two ~~[[A/D]]~~ D/A converters that connects to one of the RAM or ROM memories of two negative memory banks storing said negative indoor ~~and outdoor~~ shaped digital pulse or storing said negative outdoor shaped digital pulse based on the most significant symbol "1" of two symbols for the QPSK modulation ~~[[for]] during the indoor [[and]] or outdoor UWB operations. based on the most significant symbol "1" of two symbols for QPSK modulation.~~

Claim 16 (currently amended): The ~~shaped-pulse generator~~ multiband UWB transceiver of claim 10 wherein said ~~memory bank~~ positive pulse switch[[es]] and said negative pulse switch connect to one of the ~~RAM or ROM memories of two positive memory banks~~ containing the positive and ~~negative~~ indoor shaped digital pulses and one of the two negative memory banks containing the negative indoor shaped digital pulses during the indoor UWB operation.

Claim 17 (currently amended): The ~~shaped-pulse generator~~ multiband UWB transceiver of claim 10 wherein said ~~memory bank~~ positive pulse switch[[es]] and said negative pulse switch connect to one of the ~~RAM or ROM memories of two positive memory banks~~ containing the positive and ~~negative~~ outdoor shaped digital pulses and one of the two negative memory banks containing the negative outdoor shaped digital pulses during the outdoor UWB operation.

Claim 18 (currently amended): A multiband ~~UWB~~ ultra wideband (UWB) communication receiver comprising:
~~multichannel-based multicarrier down converters;~~
~~A/D converters connected from anti-aliasing~~
~~analog filters to digital receiver filters;~~
~~rake receivers; and~~
~~adjustable polyphase-based parallel-to-serial.~~
a low noise amplifier (LNA) coupled to an
automatic gain control (AGC);
the AGC coupled to a multichannel-based
multicarrier down converter unit;

the multichannel-based multicarrier down converter unit coupled to an analog-to-digital (A/D) converter unit;

the A/D converter unit coupled to a digital receiver lowpass filter unit;

the digital receiver lowpass filter unit coupled to a rake receiver unit;

a template pulse generator coupled to the rake receiver unit;

the rake receiver unit coupled to an equalizer;

the equalizer coupled to a deinterleaver;

the deinterleaver coupled to a decoder;

a channel estimator coupled to the rake receiver unit and the equalizer; and

a software and time control coupled to the AGC, the multichannel-based multicarrier down converter unit, the A/D converter unit, the digital receiver lowpass filter unit, and the rake receiver unit.

Claim 19 (currently amended): The multiband UWB communication receiver of claim 18 wherein said ~~adjustable polyphase-based parallel-to-serial produces an output of the serial sequence from output sequences of said rake receivers by using a controllable switch.~~ the A/D converter unit includes N anti-aliasing analog filters followed by N A/D converters and said N A/D converters have the same resolution and the same sampling rate, where N is an integer and greater than 1.

Claim 20 (currently amended): The multiband UWB communication receiver of claim ~~[[19]]~~ 18 wherein said ~~controllable switch in a clockwise direction rotates at a uniform speed of one symbol for BPSK demodulation or at a uniform speed of two symbols for QPSK demodulation.~~ the digital receiver lowpass filter unit having N digital receiver lowpass finite impulse response (FIR) filters and the rake receiver unit including N rake receivers and the digital receiver lowpass FIR filters coupled to the N rake receivers followed by an adjustable polyphase-based parallel-to-serial (P/S) unit.